

# NIOSH PPT Activities to Support Strategic Goal #3: Reduce Exposure to Injury Hazards

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Workplace  
Safety and Health



**NPPTL** *Research to Practice  
through Partnerships*

# NIOSH PPT Strategic Goal 3

## Program Objectives

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1. **Develop and evaluate warning devices for fire services.**
2. **Develop measurement and rating methods that are representative of the real-world performance of hearing protection devices.**
3. **Develop hearing protection laboratory and fit testing methods.**
4. **Evaluate the effectiveness of hearing protection devices to provide protection from impulsive noise.**
5. **Develop an integrated hearing protection and communication system.**
6. **Develop hearing protection recommendations for noise-exposed hearing impaired workers.**
7. **Develop and improve fall arrest harnesses.**
8. **Select and develop vibration isolation devices to reduce hand-arm vibration syndrome.**

# NIOSH PPT Cross Cutting Objectives Applicable to All Strategic Goals

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1. **Evaluate the physiological and ergonomic impact of PPE on individual wearers**
2. **Understand and improve the effectiveness and usability of PPE to reduce the transmission of infectious bioaerosols**
3. **Evaluate the effectiveness of PPT for protection against nanoparticles**
4. **Understand and improve the efficacy and effect of decontamination procedures for PPT**
5. **Develop and foster deployment of technologies that reliably sense or model PPT performance to ensure users receive effective protection**
6. **Evaluate integration and interoperability of PPT components and the protection provided by composite use of PPT**
7. **Develop and implement standards to address PPT gaps**
8. **Gather information on the use and usability of PPT in the workplace to identify research, standards, evaluation, intervention, and outreach needs**

# Organization/Staffing/Funding

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- **This strategic goal supported by multiple divisions & locations within NIOSH**
- **NPPTL is the lead division for this strategic goal**
  - DART & PRL (PPE Hearing Protection)
  - DSR (PPE Fall Protection)
- **NIOSH PPT research portfolio includes ~ 7 Injury projects**
- **FY09 funding for injury projects ~ \$1.8 Million**

# Reduce Exposure to Injury Hazards

## Objective 1

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**Develop and evaluate warning devices for fire services.**

- **Determination of PASS Mission Requirements**
- **Evaluation of Salivary Osmolality as an Indicator of Hydration Status**

# Determination of PASS Mission Requirements

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- **Objective** – Factual assessment of PASS failure reports to help determine if they are related to any systemic weakness
- **Planned approach** – Investigate failure reports, standards setting activities, and obtain real-world data to assess effectiveness
- **Current status** – Report from University of Maryland real-world thermal data (March)



# Evaluation of Salivary Osmolality as an Indicator of Hydration Status

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- **Objective** – determine the accuracy of salivary measurements taken with a new hand-held osmometer compared to a standard laboratory osmometer
- **Planned approach** – ~60 subjects to complete all phases. If the hand-held osmometer is found to be accurate, this could allow for detection of early dehydration in populations at risk (e.g., firefighters, military personnel, roofers, agricultural workers, etc.).
- **Current status** – protocol developed and submitted for external peer-review





# Reduce Exposure to Injury Hazards

## Objectives 2 - 6

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**Develop measurement and rating methods that are representative of the real-world performance of hearing protection devices.**

**Develop hearing protection laboratory and fit testing methods.**

**Evaluate the effectiveness of hearing protection devices to provide protection from impulsive noise.**

**Develop an integrated hearing protection and communication system.**

**Develop hearing protection recommendations for noise-exposed hearing impaired workers.**



# Reduce Exposure to Injury Hazards

## PPE Hearing Protection Research

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- **Hearing Protection for Hearing Impaired Workers**
- **Hearing Protector Testing Methods and Rating Schemes**
- **Hearing Protection and Audibility Considerations ( 2 Posters)**

For more information visit  
<http://www.cdc.gov/niosh/programs/hlp/>

# Hearing Protection for Hearing Impaired Workers

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- **Objective** – identify and/or predict when the audibility of important sounds can be improved while wearing hearing protectors.
- **Approach** – conduct a systematic investigation into speech intelligibility concerns that arise when a hearing-impaired worker is required to wear hearing protection in three phases.
- **Current status** – development of a hearing protector/speech intelligibility database.\*

\* Also supports cross cutting objective #'s 1 & 8



# Hearing Protector Testing Methods and Rating Schemes

- **Objective** – develop testing and rating methods for non-linear passive HPDs, electronically augmented HPDs, & traditional passive HPDs such that the results are reproducible across laboratories and yield meaningful Noise Reduction Ratings.
- **Approach** – HLPT will test the impulsive noise reduction testing and rating. HLPT has two applications to facilitate data analysis for the Noise Reduction Rating and the analysis and rating for impulsive noise reduction testing.
- **Current status** –
  - A shock tube & acoustic test fixture constructed.
  - Working with Acoustical Society to revise ANSI S12.42 (microphone in real ear and acoustic test fixture methods for HPDs).



\* Also supports cross cutting objective #'s 5 & 8

# Reduce Exposure to Injury Hazards Objective 7

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**Develop and improve fall arrest harnesses.**

**To be discussed in a follow on presentation.**

# Reduce Exposure to Injury Hazards

## Cross Cutting Objective 1

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**Evaluate the physiological and ergonomic impact of PPE on individual wearers**

### Posters

- Effect of Boot weight and material on gait characteristics of men and women firefighters
- Sizing Firefighters for Fire apparatus Design
- Evaluation of the Physiological Stress Imposed by a Prototype Firefighter Ensemble with Chemical/Biological Hazard Protection
- Physiological consequences of rubber and leather boots in men and women firefighters

# Reduce Exposure to Injury Hazards

## Cross Cutting Objective 5

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**Develop and foster deployment of technologies that reliably sense or model PPT performance to ensure users receive effective protection**

### Posters

- Location Aware Systems for Mine and Industrial Worker Safety
- Promoting a US based Chain Mesh Glove Sizing Standard for Meat Processing Workers
- Improved Design of Kneepads for Low-seam Mining
- Innovations to Improve Hearing Protection
- Motivational and Training solutions for hearing loss prevention

# Reduce Exposure to Injury Hazards

## Cross Cutting Objective 8

**Gather information on the use and usability of PPT in the workplace to identify research, standards, valuation, intervention, and outreach needs**

### **Posters**

- **Reverse Engineering NFPA Standard 1971 - the structural & proximity glove sizing standard**
- **Effect of an Exposure-indicating Light on Noise Reduction Experienced During Work at a Factory**
- **Comparison of NR values for fit tests and work in coal mines**
- **Causal Factors for Pesticide-related illness: five years monitoring Washington agricultural workers (2003-2007)**
- **Understanding Harness Fit for Better Fall Protection\***

\* Also supports objective #7



# Summary

- **NIOSH PPT program includes a diverse range of research projects addressing the reduction of injury hazards strategic goals and its objectives.**
  - 7+ research projects covering Strategic Goal #3
- **The PPT Program is employing a tactical approach to bridge PPT Program injury goals through its cross cutting objectives.**
  - Examine knowledge gaps
  - Understand PPE performance
  - Improve existing technologies
  - Effective communication tools → better R2P
- **Outputs are being used to support guidance and standards development organizations and apprise other agencies (NIOSH, CDC, HHS, OSHA, EPA)**

# Reduce Exposure to Injury Hazards Fall Protection

## Fall Protection Technology: Research and Practice

**Hongwei Hsiao, Ph.D.**

**Division of Safety Research  
(DSR)**

# Reduce Exposure to Injury Hazards Hearing Protection

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## Hearing Protection Technology: Research and Practice

**Brandon Takacs, MS**  
**West Virginia University**  
**(WVU)**

# Quality Partnerships Enhance Worker Safety & Health



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***Disclaimer: The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health and should not be construed to represent any agency determination or policy.***

## Thank you



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